PATENT SPECIFICATION

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(54) AN IMPROVEMENT IN OR RELATING TO THE ELECTROLYTIC MARKING OF METAL ARTICLES

(71) We, EDWARD PRYOR & SON LIMITED a British Company, of Broom Street, Sheffield 10, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:–

The invention relates to the electrolytic marking of metal articles, and has for its object to provide an improvement therein.

According to the invention, there is provided an electrolytic marking electrode which has been made by a method including the steps of applying a layer of an electrically non-conductive material on an electrically conductive blank and of removing the applied layer selectively to define the design or pattern and/or wording which the electrode is to produce, or of selectively applying a layer of the non-conductive material so that the design or pattern and/or wording which the electrode is to produce is defined by the absence of the applied coating, the formed blank having been moulded in a mass of thermosetting or thermoplastics material so that in use the latter forms the necessary gap between the conductive area of the electrode and a workpiece which is to be marked by an electrolytic marking process. The step of removing the applied layer selectively from the electrically conductive blank may have been carried out by a machining operation. The step of applying a layer of an electrically non-conductive material on the electrically conductive blank may have been carried out by applying a photo sensitive resist film to the electrically conductive blank and the subsequent step of removing the applied layer selectively may have been carried out by areas defining the required design or pattern and/or wording having been exposed to ultra violet light and developed. The electrically conductive blank, after the developing of the image, may have been etched in an acid until the inscription is approximately .005" high. The machined or etched area of the electrode, as the case may be, will preferably have been filled with a polyester or epoxy resin paste. The step of selectively applying a layer of the non-conductive material to the electrically conductive blank so that the design or pattern and/or wording which the electrode is to produce is defined by the presence or absence of the applied coating may have been carried out by an image deposition process such as silk screen printing. A length of tubing will preferably have been moulded within the mass of thermosetting or thermoplastics material, and a plurality of feed passages drilled to communicate with said tubing, so that in use of the electrode an electrolyte can be ducted through said tubing and through said feed passages to the gap betweeen the conductive areas of the electrode and the workpiece.

In order that the invention may be fully understood and readily carried into effect, the same will now be described, by way of example only, with reference to the accompanying drawings, of which:–

Fig. 1 is a perspective view of an electrode embodying the invention,

Fig. 2 is a diagrammatic view of the electrode in use for marking metal articles,

Figs. 3 and 4 are side views of a different form of electrode which has been made by the method of the invention,

Fig. 5 is a side view of the electrode after it has been moulded in a mass of thermosetting or thermoplastics material, and

Fig. 6 is a plan view.

Referring now to Fig. 1, the electrode there illustrated for marking metal articles by an electrolytic process is cross-hatched to show the area which is covered by an electrically non-conductive material. The word PRYOR which the electrode is to produce is defined (in mirror image) by the plain area, that is to say by the area devoid of electrically non-conductive material. The electrode illustrated in Fig. 1 has been made by a method which has included the steps of applying an electrically non-conductive material on an electrically conductive blank, and of removing the applied layer selectively to define the word PRYOR in mirror image. The step of applying the electrically non-conductive material has been carried

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out by applying a photo sensitive layer to the metal blank; then exposing a positive film on the layer to ultra violet light; and subsequently, after developing the image, the image has been etched in a suitable acid mixture until the etched area has been about .005" deep. The etched area has then been filled with a polyester or epoxy resin paste, and the whole electrode has been moulded in a thermosetting or thermoplastics material which has formed the necessary gap between the conductive area of the electrode and the workpiece.

In an alternative method of manufacture, the electrically non-conductive material has been removed, over the area defining the design or pattern and/or wording which the electrode is to produce, by a machining operation using an engraving cutter, again to a depth of about .005". The engraved area has again been filled with a polyester or epoxy resin paste and the electrode moulded in a thermosetting or thermoplastics material which has formed the gap between the conductive area of the electrode and the workpiece.

It will of course be understood that in either case the conductive area of the electrode can be the area of the design or pattern and/or wording itself or the area surrounding such design, pattern and/or wording. In Fig. 2 a marking operation is shown to be taking place using an electrode which has been produced by the method described. The area of the workpiece which is being marked is opposite the area of the electrode which is devoid of the electrically non-conductive material. For the sake of simple illustration the electrode in this case is not shown moulded in a thermosettting or thermoplastics material.

Referring now to Fig. 3, this illustrates diagrammatically an electrode which has been produced by the inventive method. In this case, the upstanding conductive portions of the electrode are the areas of the design or pattern and/or wording itself (they are shown to still have an etch resistant coating, the remaining area of the face of the electrode having been etched away to a depth of about .0005"). In Fig. 4 the etched area is shown to have been filled with a polyester or epoxy resin paste *P*.

In Figs. 5 and 6 the electrode of Fig. 4 is shown to have been moulded in a mass of thermosetting or thermoplastics material *t*. The surfaces *s* of the material *t* are disposed between .001" and .005" proud of the conductive areas of the electrode. A length of tubing 12, one end of which is blanked off, is shown to have been moulded within the mass of thermosetting or thermoplastics material, parallel to a longer side of the electrode, and a plurality of feed passages 14 have been drilled, as shown, to communicate with the tubing 12. The arrangement is such that when the electrode is in use an electrolyte can be ducted through the tubing 12 to the gap between the conductive area of the electrode and the workpiece. The electrode is mounted, as shown, on an aluminium plate 16 which is provided with bolt holes 18 by means of which it can be bolted in position on an electrolytic marking machine. A screw 20 which is used to mount the electrode on the aluminium plate provides an electrical connection to the electrode.

WHAT WE CLAIM IS:–

1. An electrolytic marking electrode which has been made by a method including the steps of applying a layer of an electrically non-conductive material on an electrically conductive blank and of removing the applied layer selectively to define the design or pattern and/or wording which the electrode is to produce, or of selectively applying a layer of the non-conductive material so that the design or pattern and/or wording which the electrode is to produce is defined by the absence of the applied coating, the formed blank having been moulded in a mass of thermosetting or thermoplastics material so that in use the latter forms the necessary gap between the conductive area of the electrode and a workpiece which is to be marked by an electrolytic marking process.

2. An electrode according to claim 1, in which the step of removing the applied layer selectively from the electrically conductive blank has been carried out by a machining operation.

3. An electrode according to claim 1, in which the step of applying a layer of an electrically non-conductive material on the electrically conductive blank has been carried out by applying a photo sensitive resist film to the electrically conductive blank and in which the subsequent step of removing the applied layer selectively has been carried out by areas defining the required design or pattern and/or wording having been exposed to ultra violet light and developed.

4. An electrode according to claim 3, the electrically conductive blank of which, after developing of the image, has been etched in an acid until the inscription is approximately .005" high.

5. An electrode according to either one of claims 2 and 4, in which the machined or etched area of the electrode has been filled with a polyester or epoxy resin paste.

6. An electrode according to claim 1, in which the step of selectively applying a layer of the non-conductive material to the electrically conductive blank so that the design or pattern and/or wording which the electrode is to produce is defined by the presence or absence of the applied coating has

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been carried out by an image deposition process such as silk screen printing.

7. An electrode according to any one of the preceding claims, in which a length of tubing has been moulded within the mass of thermosetting or thermoplastics material, and a plurality of feed passages have been drilled to communicate with said tubing, so that in use of the electrode an electrolyte can be ducted through said tubing and through said feed passages to the gap between the conductive area of the electrode and the workpiece.

8. an electrode for use in marking metal articles, substantially as hereinbefore described with reference to and as illustrated by the accompanying drawings.

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1600667 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

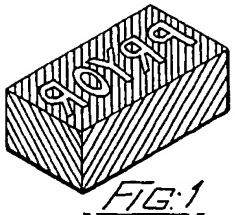

FIG. 1

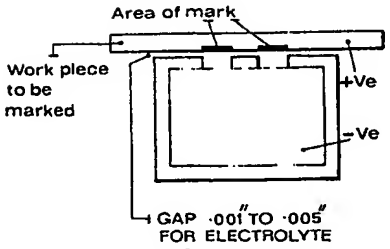

FIG. 2

FIG 3

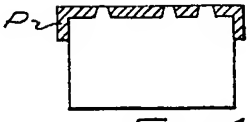

FIG. 4

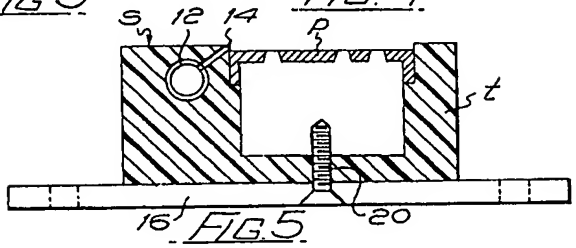

FIG. 5

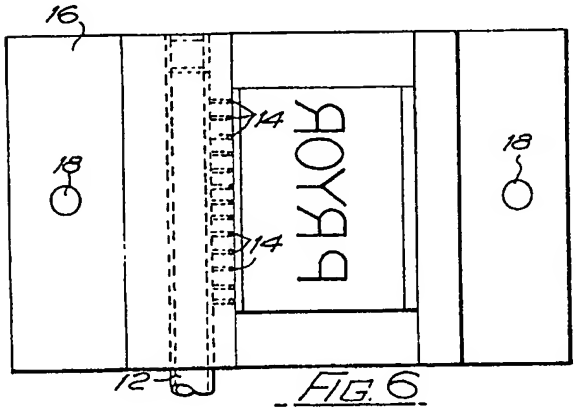

FIG. 6

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